

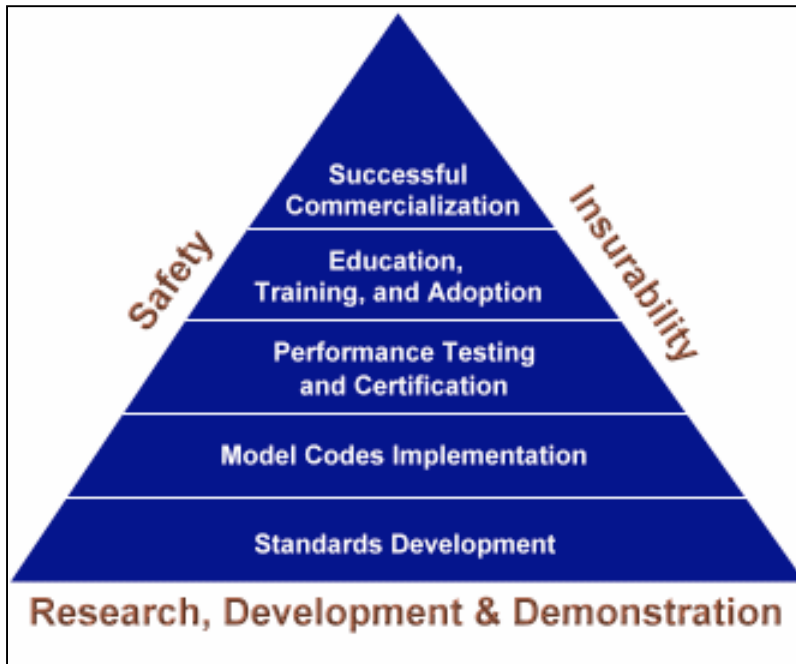


U.S. Department of Energy
Energy Efficiency and Renewable Energy

Department of Energy's Hydrogen Program

Hydrogen Codes, Standards and Safety

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Hydrogen Codes & Standards:

Goal : Facilitate the creation and adoption of model building codes and equipment standards for hydrogen systems in commercial, residential, and transportation applications. Provide technical resources to harmonize the development of international standards among IEC, ISO, and GRPE.

Objectives

- Complete an R&D roadmap under the FreedomCAR and Fuel Partnership to identify critical information needs and the timing required for systems-based standards and model codes.
- Facilitate in the adoption of the ICC codes in three key regions: North East, Mid-Atlantic, and Midwest, by 2005 through education and training materials;
- Complete the revision for high pressure hydrogen storage and pressure relief devices incorporating all current data, by 2006;
- Partner with DOT to advance an international effort to develop and adopt an R&D roadmap for a Global Technical Regulation (GTR) (1998 Agreement for hydrogen fuel cell vehicles, by 2010).



Hydrogen Safety:

Goal : Develop and implement the practices and procedures that will ensure safety in the operation, handling and use of hydrogen and hydrogen systems for all DOE funded projects.

Objectives

- Assemble panel of experts in hydrogen safety to provide expert technical guidance to funded projects, by 2004;
- Integrate safety procedures into all DOE project funding procurements. This will ensure that all projects that involve the production, handling, storage, and use of hydrogen incorporate project safety requirements into the procurements, by 2005;
- Publish a handbook of Best Management Practices for Safety. The Handbook will be a “living” document that will provide guidance for ensuring safety in future hydrogen endeavors, by 2010.



Fiscal Year 04 Budget Codes, Standards & Safety

Solicitations (\$3.0M)

New Safety Controls, Sensors
Component Testing
Flammability studies

Safety (\$5.0M)

Safety Panel
System Analysis and Test
Tracer Systems

International Standards (\$4.0M)

Analysis of Technical Requirements
Joint analysis on gaps and data needs
Create Technical Database

Domestic

Standards (\$4.0M)

Harmonize processes
Create a National Tem

Priorities

1. Create a national template for domestic and international standards
2. Establish a safety panel
3. Establish an R&D project to define separation distances for co-locating fuels.
4. Establish a joint R&D project with NASA and DOT to confirm chemical and physical properties of hydrogen and its classification.



Fiscal Year 04 Budget Codes, Standards & Safety

Solicitations (\$0.1M)

New Safety Controls, Sensors
Component Testing

Safety (\$2.8M)

Safety Panel
System Analysis and Test
Tracer Systems

**International
Standards (\$1.1M)**

Analysis of Technical Requirements
GTR Roadmap
Create Technical Database

**Domestic
Data Generation (\$2.1M)**
Harmonize processes
Create a National Temp

Priorities

1. Create a national template for domestic and international standards
2. Establish a safety panel
3. Plan a joint R&D program with NIST, NASA, EPA and DOT to confirm chemical and physical properties of hydrogen and its classification.



Barriers

- Historical data is limited
- Standards could limit technology
- Rationale for current practice cannot be verified.
- Local government, Fire Marshal and public perceptions are shaped by past history.
- Creation and adoption of new codes and standards is a slow process.



Approach

- Assess current practices and the status of technical standards development efforts, both nationally and internationally.
- Establish a knowledge baseline by collecting and validating existing published data.
- Identify gaps and needs between current efforts and those necessary for functional-based standards.
- Determine resources necessary to collect and disseminate critical information to valid CDO/SDO bodies.
- Partner with DOT to advance an international effort to develop and adopt an R&D roadmap for a Global Technical Regulation (GTR) (1998 Agreement for hydrogen fuel cell vehicles, by 2010).



Hydrogen Codes & Standards: Key Milestones

Milestone	Description	Date (FY)
3	Collaborate with ICC and NFPA to develop first-order continuing education for code officials. Modules are under development	3Q, 2004
4	Establish a coordination plan with education sub-program activity to run workshops for state and local officials.	3Q, 2004
4	Initiate comprehensive R&D program with respect to hydrogen properties, components and systems to address critical needs	4Q, 2003
24	With industry and code officials, develop technical analysis to support viable footprints for fueling stations that incorporate underground and above ground storage of liquid and gaseous hydrogen and initiate R&D efforts for validation.	1Q, 2004
30	Implement analytical and research program to support the submittal of a roadmap for a vehicle Global Technical Regulation.	4Q, 2005
32	Implement research program to support five new technical committees for the key critical standards including fueling interface, power block, and fuel storage.	4Q, 2006

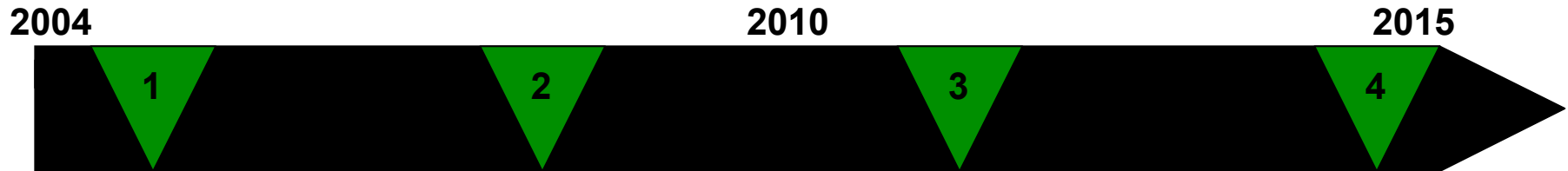


Hydrogen Safety: Key Milestones

Milestone	Description	Date (FY)
2	Develop in collaboration with NIST, NASA, DOT, and EPA, a search protocol on component and system safety.	1Q, 2004
12	Assemble panel of experts in hydrogen safety to provide expert technical guidance to funded projects.	4Q, 2003
17	Identify areas of additional study and research for failure modes scenarios.	3Q, 2004
21	Publish a safety guidelines for new procurements.	4Q, 2003
31	Establish annual review criteria for safety and protocols for site surveys.	4Q, 2004



Technical Approach



1. **2004: Assemble panel of experts in hydrogen safety to provide expert technical guidance to funded projects.**
2. **2006: With industry and code officials, develop templates of commercially viable footprints for fueling stations that incorporate underground and above ground storage of liquid and gaseous hydrogen based on verifiable data.**
3. **2008: Complete safety requirements and protocols for vehicle safety and stationary refueling.**
4. **2010: Complete best management practices handbook for hydrogen safety.**